Abstract Submitted
for the 4CF09 Meeting of
The American Physical Society

Harmonic (Lorenz) Gauge Perturbations of the Schwarzschild Metric MARK BERNDTSON, University of Colorado-Boulder — The satellite observatory LISA will be capable of detecting gravitational waves from extreme mass ratio inspirals (EMRIs), such as a small black hole orbiting a supermassive black hole. The gravitational effects of the much smaller mass can be treated as the perturbation of a known background metric, here the Schwarzschild metric. The perturbed Einstein field equations form a system of ten coupled partial differential equations. We solve the equations in the harmonic gauge, usually called the Lorenz gauge or Lorentz gauge. Using separation of variables and Fourier transforms, we write the solutions in terms of six radial functions which satisfy decoupled ordinary differential equations. The six functions are the Zerilli and five generalized Regge-Wheeler functions of spin $s = 2, 1$ or 0. We then use the solutions to calculate the gravitational self-force for circular orbits. The self- force gives the first order perturbative corrections to the equations of motion. This talk is based mainly on unpublished thesis work, which is online at www.arxiv.org (gr-qc 0904.0033).

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Date submitted: 10 Sep 2009 Electronic form version 1.4